

## GEOLOGY FIELD TRIP GUIDEBOOK

### Bedrock and Pleistocene Geology of Wayne County, Ohio

Presented in conjunction with the annual meeting of  
The Ohio Academy of Sciences at The College of Wooster,  
Wooster, Ohio, April 27, 1974.

#### Trip Leaders

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This trip will leave from the parking lot behind Lowry Center, at 9:00 a.m. Follow standard field trip procedures; i.e. keep a reasonable interval between vehicles, try to keep the car behind and the one ahead in sight. If you turn a corner, make sure the following vehicle has seen you; if not, stop and wait. Park well off the highway (good luck at Stop #5) and don't walk out on the road.



## FIELD TRIP ROAD LOG

### MILES

- 0.00 Leave Lowry Center parking lot via Spink Street. Turn right on University Avenue (first intersection)
- 0.20 Turn left at stoplight onto Beall Avenue.
- 0.55 Turn right at first stop light onto Bowman (McDonald's restaurant at intersection). Go straight ahead on Bowman through 2 stop lights.
- 1.00 4-way stop. Continue straight ahead on Bowman.
- 1.35 T-intersection. Turn left on Northwestern.
- 1.45 T-intersection. Turn right on Western.
- 1.60 T-intersection. Turn left on Oak Hill Road and go about 100 feet to another T-intersection with Liberty Street. Turn right onto Liberty.
- 1.90 Y-intersection. Bear right onto Mechanicsburg Road. Parts of quarry visible on right.
- 2.15 Turn right into quarry, just past 35 mph sign.

### STOP 1

#### Wooster Brickworks Quarry

As indicated in the Columnar Section (Figure 1) the rocks exposed in this pit represent the upper part of the Cuyahoga Formation and the lower part of the Logan Formation of the Waverly Group deposited in Mississippian time.

Over the years this has been a good locality for the collection of Waverly fossils. Student collectors have identified about 60 species representing 8 phyla from the rocks of this pit. Brachiopods (many genera and species), bryozoa (both branching and lacy), pelecypods (both scallop-like and clam-like), gastropods (both coiled and conical), and crinoids (stem and arm fragments) are fairly common. Conularids, crinoid heads, cephalopods (straight nautiloids), and trilobites (very small pygidia only) are rather rare.

The shale exposed along the sides of the trench and big hole at the southwestern side of the pit contains clay-ironstone concretions and concretionary layers. These hard layers, although difficult to work, provide a greater variety of fossils than any other rock in the pit. Fossil distribution in the sandstones and conglomerate is rather erratic but iron-stained impressions of many types can be found in the blocks that have fallen from the cliff or have been dumped from the bench above.

Oscillation ripple marks and cross-lamination are common in the sandstones. These may be seen in blocks near the foot of the cliff. Several generations of ripple marks each trending in a different direction may be seen in some of the blocks.

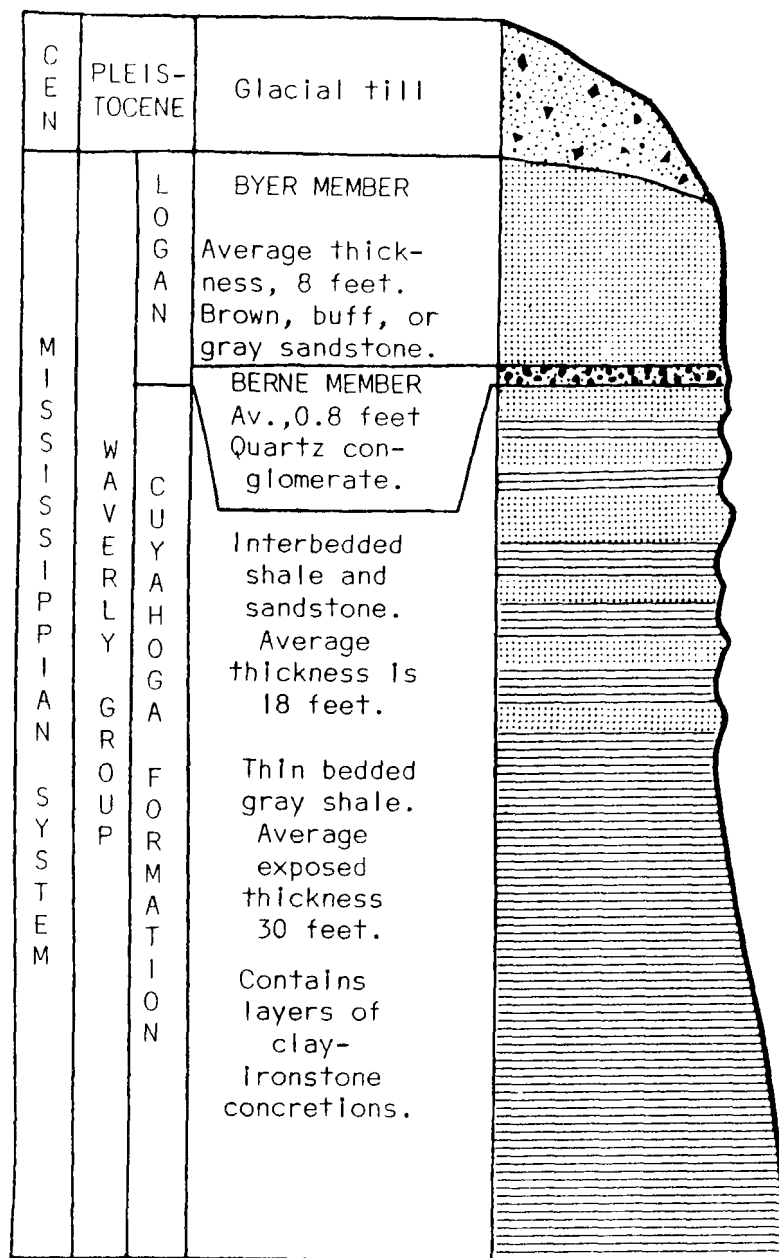


Figure 1  
 COLUMNAR SECTION  
 showing rocks exposed at the shale pit of the  
 Medal Brick, Inc., Wooster, Ohio

A. Phylum Mollusca, Class Pelecypoda, Aviculopecten; B. Phylum Mollusca, Class Pelecypoda, Sphenotus; C. Phylum Mollusca, Class Cephalopoda, Michelinoceras; D. Phylum Mollusca, Class Gastropoda, Platyceras; E. Phylum Mollusca, Class Gastropoda, low-spined gastropod; F. Conularid, a fossil of uncertain classification; G. Phylum Brachiopoda, Spirifer; H. Phylum Brachiopoda, Dictyoclostus; I. Phylum Brachiopoda, Chonetes; J. Phylum Echinodermata, Class Crinoidea, crinoid arm; K. Phylum Echinodermata, Class Crinoidea, crinoid column; L. Phylum Bryozoa, Fenestrellina; M. Phylum Bryozoa, branching bryozoan; N., O. Phylum Arthropoda, Class Trilobita, Griffithides (N is pygidium or tail section only). Drawings by David McGrail; fossil identification by R. M. Liebe.

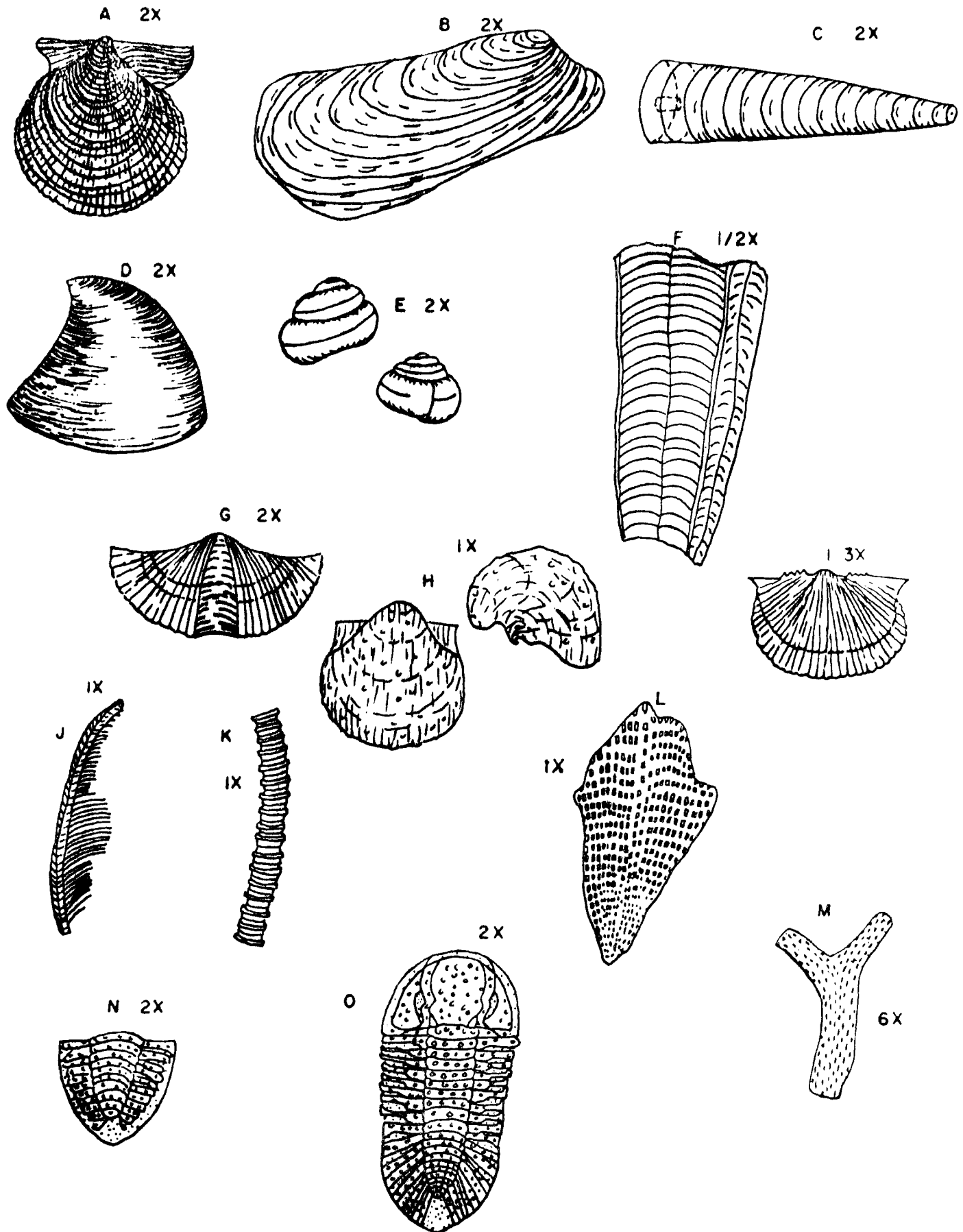


Figure 2. Fossils in the Brickwork Quarry

- 2.15      Leave Brickworks Quarry and turn left. Watch for traffic from the right as you leave the quarry. Proceed back along Mechanicsburg Road.
- 2.45      Y-intersection. Veer left onto Liberty.
- 3.05      Traffic light. Go straight ahead on Liberty (actually it's a slight veer to the left.)
- 3.15      Turn right at Shell station, one block from traffic light. Follow this street (Vanover) around east side of Fairgrounds.
- 3.35      T-intersection of Vanover and Columbus Road (Ohio Route 3). Turn right onto Columbus Road.
- 3.50      Crossing over U.S. Route 30 and flood plain of Killbuck Creek. Proceed straight ahead on Route 3.
- 4.65      Turn left onto State Route 226 (follow Shreve signs). Get into left lane prior to turn and watch traffic. This is a dangerous intersection.
- 6.40      View of Killbuck Valley on left.
- 8.75      Begin to climb small hill, view of Shreve Swamp on left.
- 9.30      Large red barn on right. Pull off on right shoulder.

## STOP 2

Overview of Killbuck Valley and discussion of Pleistocene drainage changes.

Examination of the drainage system of the Killbuck Valley presents some interesting paradoxes. Killbuck Creek, like many other streams of North-Central Ohio, flows in a valley that narrows in a downstream direction. The stream itself appears to be too small relative to the size of its valley. The entrance angles of some of its tributaries are abnormal as compared to expected stream development. Obviously, these characteristics point to the fact that the Killbuck Pattern has been inherited from pre-existing drainage systems. The history of its development is quite complex, but a brief sketch is provided in the following paragraphs. The reader is referred to Figure 3, a, b, c, d.

Near the end of the Tertiary, the topography of the bedrock surface in Wayne County resembled that of a maturely dissected peneplain, with the upper surface lying near an elevation of 1200 feet. Physiographically the area was one of low relief, with gentle rolling hills, broad mature valleys, and low gradient stream systems. The elevation of the valley bottoms was approximately 1,000 feet.

The ancestral Killbuck was a typical stream in this area, gathering its headwaters from the preglacial highland divide located in southern Holmes County (heavy line in Figure 3a). The stream flowed to the north, reaching the Wayne-Holmes County boundary just south of Stop 2. At this point it turned and flowed northwestward

Fig. 3a Preglacial Drainage

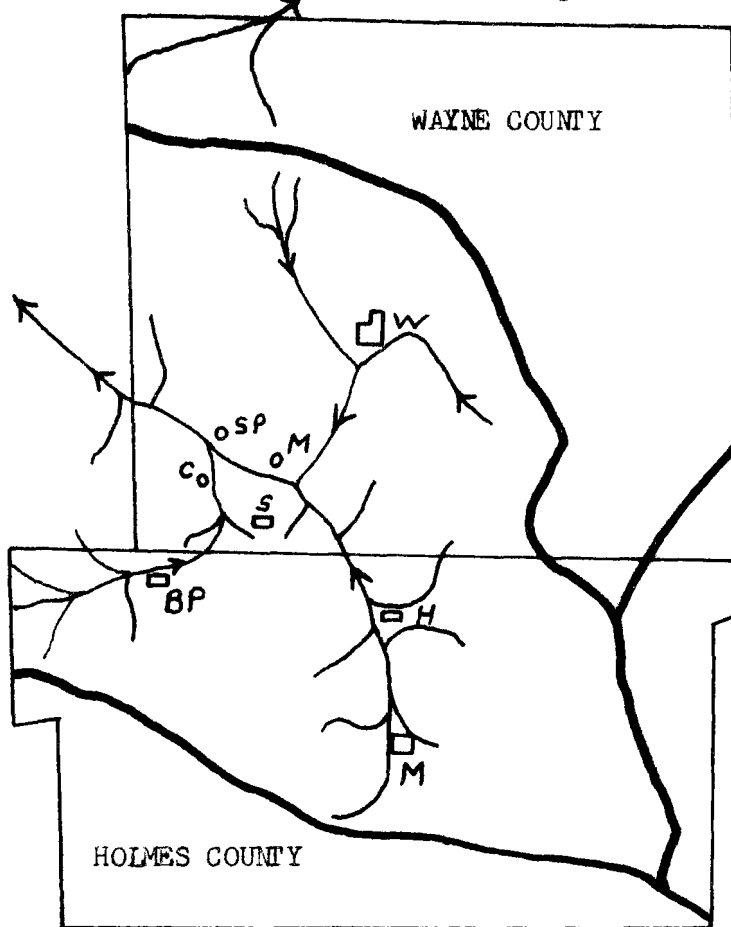


Fig. 3b Deep Stage-Yarmouth

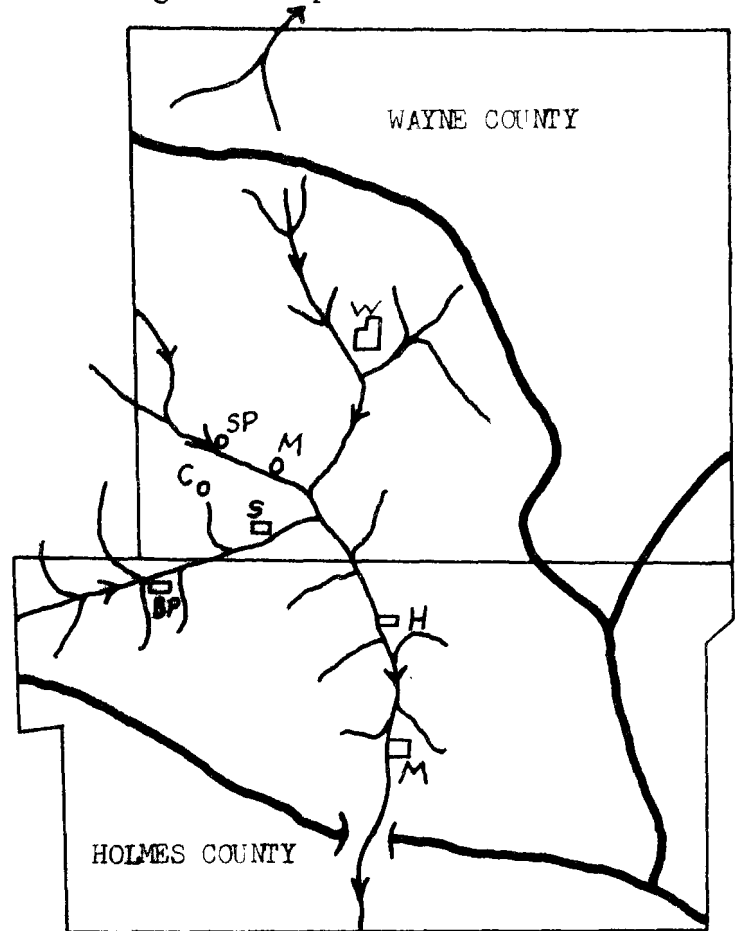


Fig 3c Sangamon Interglacial

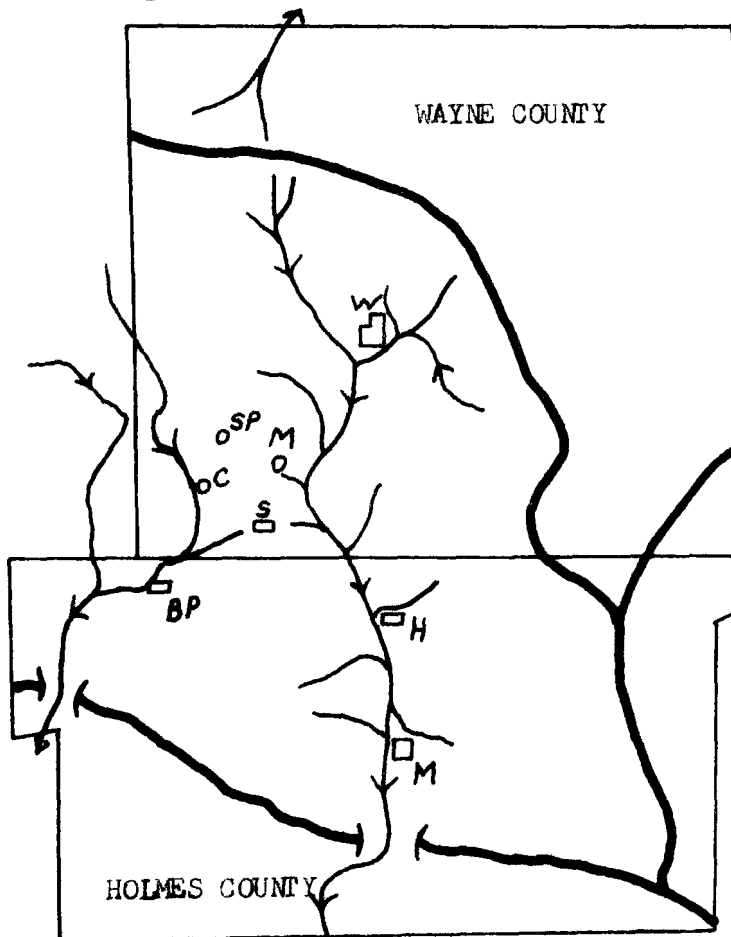
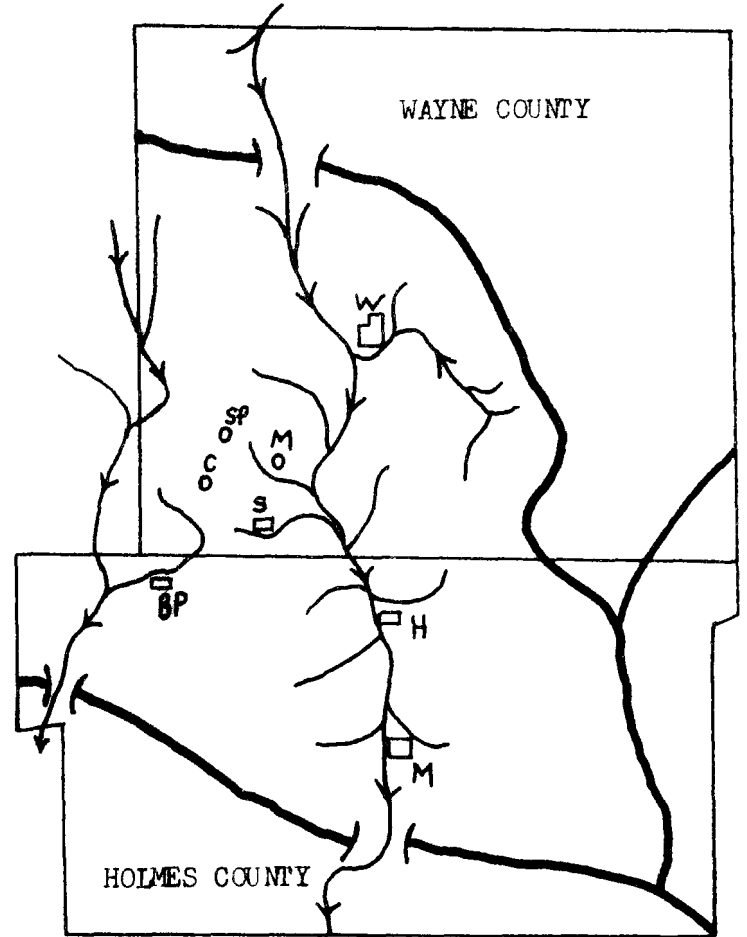


Fig. 3d Post- Wisconsin Drainage



across the southwestern corner of Wayne County. The main channel passed through what is now the small village of Millbrook (M), thence northwestward up the present Jerome Fork Valley in Ashland County.

Tributaries from the northeast and southwest joined the Killbuck as it flowed across Wayne County. The tributary from the northeast followed a course similar to the present-day Killbuck-Apple Creek system; the southwest tributary flowed from Ashland County near Loudonville, through Big Prairie (BP), and entered the main Killbuck channel near Craigton (C).

With the invasion of Kansan glacial ice, the northward drainage of the preglacial Killbuck was blocked and temporary lakes formed between the ice front and the highland divide near Millersburgh (M) in Holmes County. As the lake levels rose, the divide was eventually overtopped and water began to flow out to the south. This resulted in the cutting of a col in the preglacial drainage divide.

The long interval of erosion between the Kansan and Illinoian glacial stages is called the Yarmouth Interglacial or Deep Stage period. The Killbuck drainage, having been reversed to the south through the col near Millersburg, now cut a deep valley of youthful character (Figure 3b). Through the process of headward erosion, the southwest tributary was diverted slightly to the south, eventually joining the main channel of the Killbuck just east of Shreve(S).

The Illinoian glacial stage produced another major change in the Killbuck Valley. In addition to filling the Deep Stage valley with glacial drift, the Illinoian ice blocked the portion of the valley between Millbrook and Springville(SP). The southwest tributary was also blocked just to the east of Shreve at the same time. As had happened in Kansan time, lakes formed and overflowed, resulting in the cutting of a new col in the Holmes County drainage divide (Figure 3c).

The period of erosion following the Illinoian stage is called the Sangamon Interglacial. During this time drainage lines followed courses similar to those of the present day. The central portions of Wayne County were drained by the Killbuck-Apple Creek system. The southwest was drained by the newly-formed Lake Fork-Muddy Fork complex (Figure 3c).

The Wisconsin glacial advance left the Killbuck Valley much the same as in Sangamon times. The Wisconsin ice left more glacial drift in the valley, creating new stream gradients of low character. In places, restricted valley width and ice blockage resulted in the formation of temporary lakes, swampy areas, and lacustrine plains.

The most significant post-Wisconsin drainage change in the Killbuck occurred through stream capture between two headward-eroding streams. The result was the formation of a col in the drainage divide near Overton (O) in the northern Killbuck Valley (Figure 3d).

- 9.30      Leave Stop 2 and proceed straight ahead on 226.
- 10.20     Morainic materials on left. Munson's Knob is visible on the horizon to the east (left).



- 10.75      Entering Shreve.
- 11.10      Passing school warning sign, prepare to turn right.
- 11.30      Shreve Lake sign--turn right onto Robinson Street and go one block to next intersection.
- 11.35      Turn left onto Main Street. Go one short block.
- 11.40      Turn right onto unmarked street (County Road 316) and proceed uphill.
- 11.70      Leaving Shreve on County Road 316, proceeding west.
- 12.45      Pass Shreve Lake Dam on right.
- 12.95      Stop sign at crossroads. Proceed straight ahead.
- 13.35      Brown, wooden house with beauty parlor in basement on left. Turn left into hidden lane immediately beyond house. If there are too many vehicles, go about 0.1 mile further on 316 and park on the left shoulder.

## STOP 3

## Brown's Bog

Brown's Lake, two miles west of Shreve, is considered to be a kettle hole lake formed by the melting of a large block of Wisconsin ice surrounded by till and/or outwash. It has no outlet but is gradually being filled in by vegetation which occurs in definite zones around the lake. These zones include a zone of hardwood trees on the bank around the lake, softwood trees and shrubs on the lowlands around the lake, which grade into the bog-plant zone in the lake proper. This vegetation is forming a thick layer of organic peat, which can be examined around the edges of the lake. The thickness of the peat is not known but exceeds 20 feet. Because the land around the lake is so low, very little soil or clay is being washed into the lake so the sediment is almost all organic.

To the west of Brown's Lake on the flat valley floor, which is the bed of glacial Lake Craigton, the soils are black and very rich in humus. This type of soil is referred to as muck, which is defined by the American Geological Institute's Glossary of Geology and Related Sciences as "dark-colored soil, commonly in wet places, which has a high percentage of decomposed organic matter." These clay-poor soils are derived from the decomposition of peat, similar to that seen at Brown's Lake. These farm areas are referred to as mucklands.

- 13.35      Leave Brown's Bog
- 13.45      Intersection of Wayne County Roads 233 and 316. Continue straight ahead on 316.
- 13.90      Note the black muck soils, remnants of former lake bottoms.
- 14.60      T-intersection with Wayne County Road 16. Turn left.

- 14.70 Note knob and kettle topography on left.
- 15.00 T-intersection with Wayne County Road 3. Turn left onto gravel road. Brown's Lake and Bog are now on your left.
- 16.60 T-intersection with Wayne County Road 149. Turn right.
- CAUTION! 17.10 Unguarded railway crossing. This is the main line of the Penn Central system, so use extreme caution before venturing across the tracks.
- 17.30 Stop sign. Turn left onto Holmes County Road 226.
- 17.95 Stop sign at intersection with State Route 514. Go straight ahead, road changes to Wayne County Road 1 on the other side of the intersection.
- 20.10 Munson's Knob visible on horizon, slightly to the left of front.
- 21.60 Very sharp curve to right. Use caution or end up in someone's living room.
- 22.50 Passing through Shreve Swamp. There are a series of four narrow, one-way bridges on this stretch, some of which may be under water during the spring.
- 23.30 Intersection with State Route 83 (base of Munson's Knob). Turn right (south).
- 24.25 Large barn with Mail Pouch ad on the side; prepare to stop.
- 24.35 Pull off (left) into quarry parking lot. Be careful, this is a heavily-traveled road.

**STOP 4****Kame Terrace**

Stratified deposits in the sand and gravel pit on the left.

White (1949, p. 37, 38) points out that this deposit is part of a kame terrace that "extends from one-half mile north of the Wayne-Holmes County line to the point where Salt Creek enters Killbuck Creek. From the county line to Tea Run the terrace is about one-eighth mile wide. It is almost absent from Tea Run to a point about one-half mile south. It thence becomes gradually wider, being one-half mile wide at its southern end a little less than one mile north of Holmesville. --The material of these terraces ranges from dirty, bouldery, poorly-sorted gravel with obscure bedding, to well-sorted, medium-grained gravel in horizontal strata."

White (1949, p. 33) expresses the opinion that "in Holmes County the ice sheet in the waning stage of glaciation lost all forward motion. The ice sheet melted down as well as back. The hilltops appeared first above the ice and the final stage of ice disappearance was that of blocks, in most places elongate, in the major valleys. Meltwater from the ice blocks flowed between the blocks

and the valley sides. Stratified deposits, generally gravel were laid down. Upon the final melting of the ice masses in the valleys, gravel deposits were left in terrace-like forms along the valley sides. The place of the former ice blocks remained as kettle holes."

The gravel removed from this bank may be used as it is (bank run gravel) for some purposes such as gravel roads but must be sized (screened) and washed for other purposes such as concrete aggregate. Clay ironstone concretions which are rather abundant in the gravel cause some trouble. After concrete has been poured and has hardened, oxidation continues in the concretions. Commonly those near the surface swell and "pop out" forming conical, iron-stained pits.

One feature that is rather common in deposits of this type occurs near the north end of the cut. It is a resistant "monument" which has been by-passed by the shovels because of its hardness. This gravel that has been thoroughly cemented by calcium carbonate deposited from percolating ground water.

- 24.35      Leave Stop 4. Proceed south on 83.
- 25.60      Sharp left on road.
- 26.10      Sharp right, cross Salt Creek and flood plain.
- 26.30      Enter Holmesville.
- 26.50      Stop sign at T-intersection. Turn left, following Route 83 signs to next intersection (traffic light).
- 26.55      Turn right; stay on 83 (Millersburg Road).
- 26.70      Dairy Isle drive-in. Morainic ridge to front.

As you continue south from Holmesville, look ahead, to the right, and to the left. You will see what White (1949, p. 27-28) describes as "a morainic ridge of peculiar form that extends almost across the Killbuck Valley in Prairie Township south of Holmesville. This ridge (stippled in Figure 4) lies east of Killbuck Creek. The eastern end of the moraine is located in S Sec. 2 where it emerges from the kame terrace area on the north side of Martins Creek. The ridge extends for 1 mile southwest into central Sec. 10 where it bends northwest to its termination at the southwest corner of Holmesville. The ridge is one-eighth of a mile wide at its eastern end, increases to a width of three-eighths of a mile in its central portion, and decreases to one-quarter mile at its western end. It ranges from 60 to 80 feet in height.

The surface of the moraine is composed of low knolls and a few shallow kettle holes. The material of which it is built is mainly sandy to gravelly till. Some masses of dirty gravel are included in the till, but no large masses are known, although local contractors have prospected the ridge carefully in their search for road gravel.

This morainic ridge does not now extend entirely across the Killbuck valley nor does it give evidence of ever having done so. There is no tall ridge on the west side of Killbuck Creek which would match with the west end of the Moraine. Three possible modes of origin for the ridge are here considered:

- (1) The morainic ridge may have been deposited in a crevasse or open space between dead ice blocks in the valleys of Martins and Killbuck Creeks and in the lowlands of Holmesville . . . . However, crevasse fillings consist mainly of water-sorted material, and this ridge is mainly till. It is therefore not the usual crevasse-filling type.
- (2) It may have been deposited at an active ice front which stood in this location after the territory to the south had been freed of ice. A definite ice front never existed to the east or west of this moraine on the upland, but a small lobe of ice in the lowland north of the moraine may have maintained its continuity with the main ice sheet, while to the east and west the ice sheet had become disintegrated into separated masses and blocks. The absence of an outwash plain south of the moraine indicates that sufficient open space did not exist for its deposition, probably because masses of dead ice were present there.
- (3) The ridge may have been deposited by live ice while dead ice remained in front. Kame terrace gravel across Martins Creek immediately south of the moraine shows that dead ice existed just south of the position of the moraine at some time. The kame terrace and the moraine are distinctly separated from each other, and it seems most logical that the agent which kept them separated was dead ice which was present south of the moraine while it was being deposited."

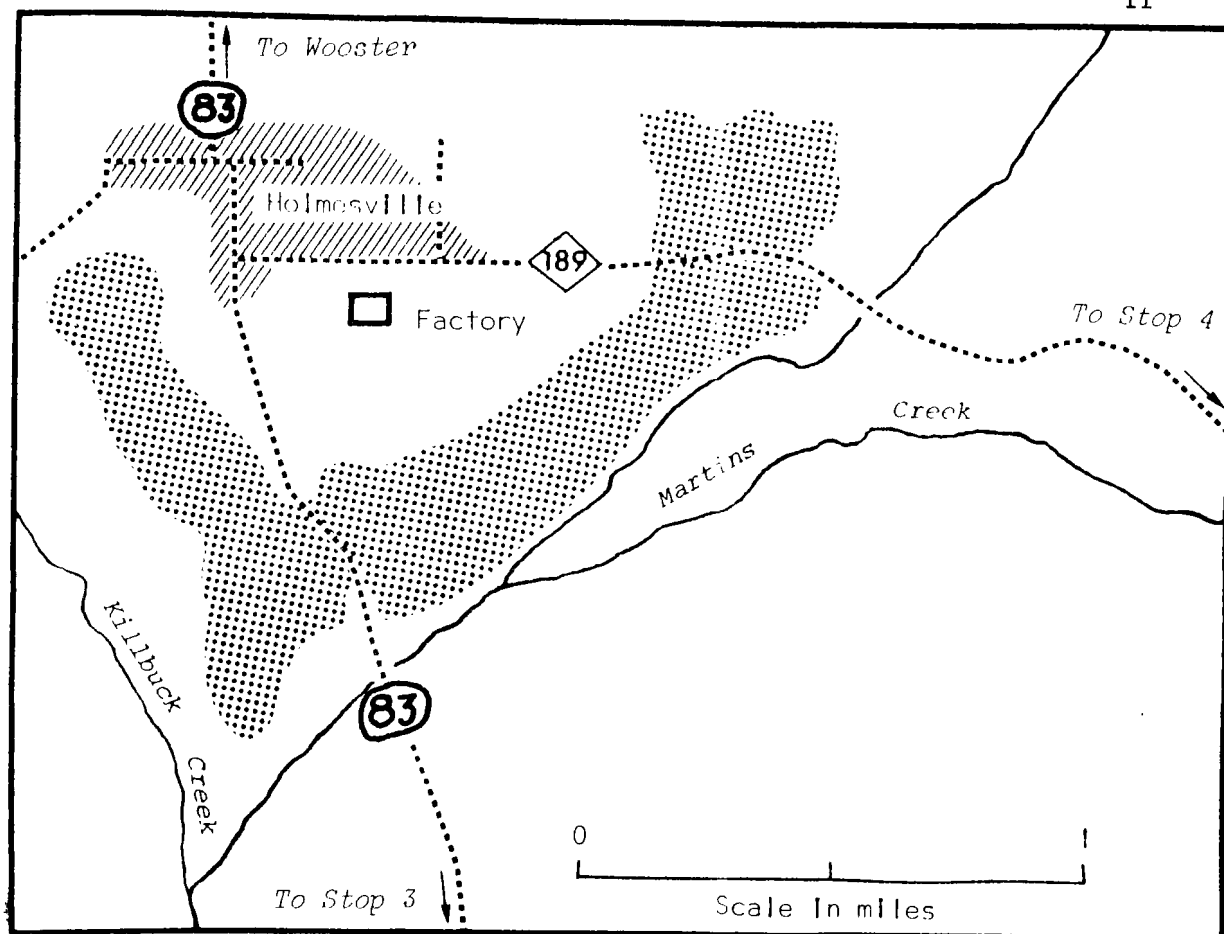


FIGURE 4.

27.10-27.50 Crossing Wisconsin recessional Moraine.

27.85 County Home on left.

28.85 Pull off on right shoulder. Make sure all four wheels are off the pavement and out of the swamp (good luck!). This is a zone of heavy, fast-moving traffic. Use extreme care at this stop. With luck, the Holmes County sheriff's department will have a car out here to help slow the traffic.

#### STOP 5

#### Mississippian-Pennsylvanian Unconformity

The following discussion has been condensed from the work of Conrey (1921), Multer (1955 and 1957), and VerSteeg (1948):

In the area that is presently eastern Ohio the end of the Mississippian was marked by a period of erosion while the seas were absent. This erosion continued long enough to produce a surface with considerable relief. Dendritic streams draining toward the southeast cut into the surface until the relief reached a maximum of 270 feet with differences in elevation of more than 150 feet within a short distance being common. In early Pennsylvanian, Pottsville time, this area was invaded by the ocean. The earliest sediments, e.g. the Sharon conglomerate, are confined to the valleys and basins between the hills on the Mississippian surface.

AVERAGE STRATIGRAPHIC SECTION  
(after White, 1949)

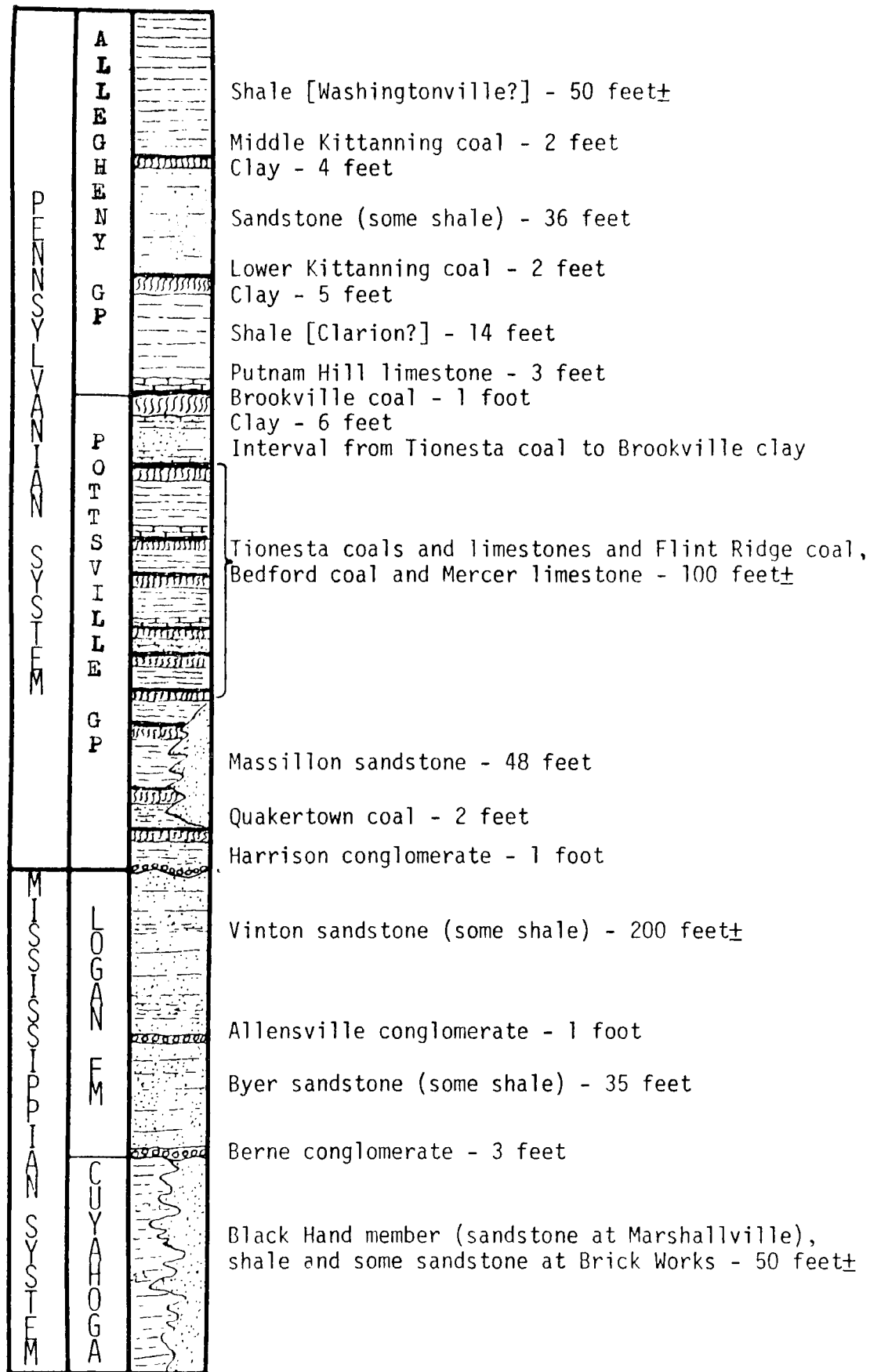


Figure 5

The Pottsville sea apparently advanced rapidly over the surface with the water becoming deep fairly quickly. The fragments of Waverly sandstone contained within the Pottsville are for the most part angular though they show the effect of movement by waves and currents. That the hills on the Mississippian surface were buried and not eroded down also indicates rapid subsidence.

The Mississippian-Pennsylvanian contact at this location is shown by the basal Pennsylvanian Pottsville Group resting uncomfortably on the Logan Formation of Mississippian age. White (1949, p. 55) describes the basal conglomerate of the Pottsville, the Harrison members as follows:

The Harrison member is composed of pebbles and cobbles of quartz, chert, and silicified limestone, and of coarse sand, cemented by clay material, silica or iron compounds. The pebbles and cobbles are well rounded. The silicified limestone fragments range from a fraction of an inch to 6 inches or more in diameter. Casts of fossils are present, and from a study of these . . . Conrey (1921 p. 89) concluded that they are derived from the Maxville Limestone . . . . It is regarded as likely that before the Harrison member was deposited the surface was discontinuously covered with resistant fragments of residual Maxville material from which all carbonate had been leached. The surface had been eroded below the Maxville horizon. The residual fragments were transported by streams and currents, indicated by the rounded character of the pieces . . . . The average thickness of the member is 1 foot, 1 inch.

The Quakertown coal, which normally lies 10 to 20 feet above the unconformity is in this outcrop replaced by the Massillon member of the Pottsville. This is a massive, coarse-grained sandstone containing 1 to 2 foot layers of rounded quartz pebbles near the base and scattered bands of these pebbles as high as 40 feet above its base. It is generally tightly cemented but occasional lenses of cross-bedded, friable sandstone are present in outcrops higher on the ridge. This unit also contains casts and impressions of what appear to be Calamites(?).

There is some question as to the actual location of the unconformity itself. At this outcrop, we find two distinct conglomerates overlying the buff, fine-grained sandstone; White (1949, p. 59) believes this to be the Vinton member of the Logan Formation. He puts the contact at the base of the lower of the two conglomerates, calling it Harrison and apparently assuming that the upper conglomerate is a basal layer in the Massillon sandstone. However, on close examination of what White calls Harrison, one notes the conspicuous absence of both the chert nodules and the quartz cobbles that were previously described as being characteristic of this basal conglomerate. Also, about 150 feet south of this outcrop is an exposure of an almost identical conglomerate which is both underlain and overlain by similar sandstone beds. Here the unconformity is above the conglomerate and separated from it by 5 feet of sandstone.

These observations indicate the possibility that this conglomerate is not the Harrison of Pennsylvanian age, but rather the Allensville conglomerate which lies between the Byer and Vinton members of the Logan Formation (see Figure 3). Conrey (1921, p. 81) describes the Allens-

ville as:

. . . a marine conglomerate which varies in thickness from 8 to 24 inches. . . . were it not for this conglomerate, there would be little basis for dividing the beds above the Berne horizon (i.e., the Byer and Vinton members), as it forms the only marked break in a long succession of fine-grained sandstones and shales . . . . It consists of a rather firmly cemented matrix of medium to coarse-grained sandstone with quartz pebbles ranging from one-eighth to one-half inch in diameter.

Lamborn (1954, p. 30) states that "the similarities in lithologic characteristics of the Vinton and Byer members in many areas are such that their separation is difficult in the absence of the intervening Allensville."

This evidence, then, introduces the possibility that the unconformity lies between the two conglomerates, especially since the upper bed has many of the features that White ascribed to the Harrison, including an iron-rich matrix, quartz cobbles and pebbles, and chert nodules some as large as 3 inches in diameter.

- 28.85      Leave Stop 5 and proceed south on Route 83.
- 29.90      We will reverse our direction by turning into and going through the circular drive in front of the nursing home. Note the Mississippian (Logan?) sandstone at the north end of the driveway.
- 33.35      Re-entering Holmesville.
- 33.55      Traffic light in Holmesville, turn left on Ohio 83, retracting route through town. Turn right on 83, one block after light.
- 34.00      Bridge over Salt Creek, go straight ahead onto Holmes County Road 245. Do not follow 83. Entering heavily Amish district. Watch out for horse-drawn vehicles, especially at the crests of hills.
- 34.90      Tree-covered Munson's Knob ahead and slightly to left.

#### STOP 7

Munson Knob, spelled Munser on the old maps (ahead and to the left), is an erosional remnant that rises above the general upland to an elevation of almost 1300 feet.

The knob itself is composed of sedimentary rocks of the upper part of the Pottsville Group and the lower part of the Allegheny Group (both Pennsylvanian). The Brookville coal, which is the basal member of the Allegheny Group was once mined on the southwest side of the knob; the Putnam Hill limestone, which lies above the coal, is exploited north and east of the knob by the Holmes Limestone Company.

The wells which you see in this area are a few of the nearly 150 wells drilled to depths of 3000-3500 feet within the approximately 6 square mile area of the Moreland Oil Pool. The oil and gas in this pool are found in two different Silurian reservoir rocks, each representing a distinctive ancient environment. At a depth of approximately 3000 feet, gas and some oil are obtained from cavities



and fractures in the "Newburg" dolomite, probably a former reef-type limestone. At approximately 3500 feet the drill bit encounters the oil and gas bearing "Clinton" sandstone. These lenticular, well-sorted, fine grained sandstone beds contain marine fossils and plant fragments and appear to be ancient off-shore bars.

Most of the wells in the Moreland Pool were drilled with cable tools but a few have been drilled by rotary outfits. The rotary drilling method is more expensive than the cable tool method but takes only one-third as long (about 17 days) to drill down to the "Clinton." This rotary method also makes it possible to recover cores of the producing beds for further study.

Post-drilling to the "Newburg" dolomite, hydrochloric acid is pumped down to dissolve larger openings in the dolomite. To increase the permeability of the "Clinton" sandstone, oil and loose sand are pumped under tremendous pressure into the rock to open and maintain passageways for additional oil and gas flow. Initial production after such fracturing ranges from 75 to 1000 barrels per day with varying amounts of gas up to 1,600,000 cubic feet per day. Initial production figures, however, are not an indication of what the well will produce over the years. Most wells soon decline to a rate considerably lower than their initial production. According to Multer (1963, p. 4) "the discovery well of the Moreland Pool, Smith Petroleum Co. No. 1 Baker Community,--which was drilled into the "Clinton"--yielded 16 barrels of oil and a show of gas before fracture. The initial rock pressure was 1100 pounds per square inch. After hydraulic fracturing with 2000 pounds of sand and 650 barrels of oil, the well yielded 700 barrels of oil and 1,555,000 cubic feet of gas in the first 24 hours. Production soon settled to a rate of 100 barrels per day."

- 36.50 Stop sign at base of Munson's Knob. Turn right onto Wayne County Road 2.
- 37.50 Turn left at Wayne Mines Division sign.
- 38.05 Entrance to strip mine.

#### STOP 6

#### Wayne Mines Division, Holmes Limestone Company

Only about 25% of the bedrock surface of Wayne County is represented by Pennsylvanian strata, which are found principally along the eastern and southern margins of the county. To the north and west, erosion has effectively removed all but a few Pennsylvanian outliers. Stripping operations are thus considerably restricted in the county.

The principal product of this pit is not coal but limestone. The deepest portions of the pit expose the Brookville Clay which is the uppermost unit of the Pottsville Group. This is in turn overlain by the Brookville Coal (the basal unit of the Allegheny Group) and the Putnam Hill Limestone. Above this are about 15 feet of gray-buff shale. Pyritized clams and brachiopods, as well as crinoid stems up to one inch in diameter, attest to the marine origin of the limestone and shale.

Above the shale is a 2-3 foot thick underclay immediately overlain by the Lower Kittanning coal. In many places the latter unit has been removed by erosion and has been replaced by glacial till.

Semi-measured Stratigraphic Section

Glacial Till	0-8'	Pleistocene
	Unconformity	
Lower Kittanning Coal	1.5'	
Underclay	2-3'	
Gray-Buff Shale	15'	Allegheny Group
Putnam Hill Limestone	6'	Pennsylvanian
Brookville Coal	1-3'	
Brookville Clay	1-3'	Pottsville Group

- 38.05 Leave strip mine. This is the last stop of the trip. You are free to return home via the most convenient route; however, if you are sharing rides with others, please follow the field trip route back to The College of Wooster.
- 38.55 T-intersection with Wayne County Road 2. Turn right. Alternatively, turn left and drive two miles into Fredricksburg, an Amish shopping area. Ask one of the field trip leaders for instructions on returning to Wooster from Fredericksburg.
- 39.55 Cross Wayne County 90 (same as Holmes Co. 245), passing over south shoulder of Munson's Knob.
- 40.85 Intersection with Ohio Route 83. Turn right.
- 43.95 Moreland
- 45.00 Keep right on 83. View of Killbuck Valley and Wooster in distance.
- 49.10 Intersection with U.S. Route 250. Proceed straight ahead down steep hill. Ohio Agricultural Research and Development Center on right.
- 49.85 Traffic light. Keep straight ahead over U.S. Route 30.
- 50.25 Entering Wooster on South Bever Street. Proceed north on Bever through five traffic lights to University Avenue and The College of Wooster.
- 51.45 University Avenue and Bever. Turn right onto University.
- 51.65 Traffic light at University and Beall. Go straight ahead one block.
- 51.75 Turn left onto Spink Street and Lowry Center parking lot. End of trip.

References

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